

49-5-11/18

The nature of changes in the intensity of emission of the Earth's atmosphere. (Cont.)

of the emission during the night. Wilkes (10) has shown that the tidal effects are strong at greater heights. Therefore, they will have a maximum effect in emissions originating at greater heights. It is shown that apart from temperature changes in the upper atmosphere ultra-sonic waves can increase the concentration of the final products of the reactions which determines the intensity of emission in the upper atmosphere. It is further shown that the solar activity has no real effect on the emission of the Earth's atmosphere. This indicates that either the temperature of the upper atmosphere does not change with solar activity, or that the main primary reactions responsible for the emission by the upper atmosphere are of the three-component type; two-component reactions occur only with the appearance of the secondary excited products. It is very desirable that further studies of emission should be made during the International Geophysical Year. This is particularly important because the possible changes in the emission could then be contrasted with a number of other geo-physical phenomena. For example, all ionic combination processes in the ionosphere (which determine the electron-density) are

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The nature of changes in the intensity of emission of the Earth's atmosphere. (Cont.)

also connected with two or three component reactions, while magnetic disturbances are inseparable from tidal phenomena and circulations in the upper atmosphere.
There are 10 references, 2 of which are Slavic.

SUBMITTED: September 6, 1956.

ASSOCIATION: Ac.Sc. U.S.S.R. Institute of Physics of the Atmosphere.
(Akademiya Nauk SSSR Institut Fiziki Atmosfery).

AVAILABLE: Library of Congress

Card 4/4

Krasovskiy, V. I.

26-12-21/49

AUTHOR: Krasovskiy, V.I., Doctor of Physico-Mathematical Sciences

TITLE: First Results of Observations of the Upper Atmosphere (Pervyye rezul'taty nablyudeniya verkhney atmosfery)

PERIODICAL: Priroda, 1957, No 12, pp 87-88 (USSR)

ABSTRACT: The article deals with observations of condition in the upper atmosphere and radiolocational reflections obtained from the aurora borealis by several observation stations under the control of the AN, USSR Institute of Physics of the Atmosphere. Measurements revealed that temperatures in altitudes of approximately 100 km were increasing toward the north, changing from about 200°K to 400°K in polar regions. During the time polar lights were observed, frequent emissions of hydrogen of extraterrestrial origin were registered. Contours of the spectrum lines of hydrogen indicated that radiating hydrogen particles moved about at the rate of 1,000 - 2,000 km/sec. Also intense emissions of ionized atomic nitrogen were noted, resulting from bombardment of the air by helium corpuscles, indicating the vital part of helium in geomagnetic and ionospheric disturbances.

~~Card 1/2~~

Inst. Physics of Atmosphere AS USSR

KRASOVSKIY, V. I.

✓ 483 17
STUDIES OF THE UPPER REGIONS OF THE ATMOSPHERE
PHERE, V. I. KRASOVSKIY (Moscow Inst. of Atmosphere
Physics). Priroda 48, No. 6, 66-67(1967) May. (In Russian)
An outline is given of studies programmed by the Inst. of
Atmosphere Physics for their three new stations located at
68°33' latitude 89°20' longitude; 60°12' latitude 29°34' longi-
tude; and, 68°42' latitude 36°44' long. The stations are
equipped with spectrographic and radiolocating apparatus
for the studies of atmospheric emissions. (R.V.J.)
W. any

Div. Physics-Math Sci

AUTHOR: Krasovskiy, V. I.

53-4-3/11

TITLE: The Formation of the Hydroxyl System in the Radiation of the Nocturnal Sky (Proiskhozhdeniye gidroksil'noy sistemy v izluchenii nochnogo neba).

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1957, Vol. 63, Nr 4, pp. 673-691 (USSR).

ABSTRACT: The present survey is arranged as follows: Introduction, discussion of the nature of hydroxyl emission (The O_3 hypothesis, the O_2^* hypothesis), the atomic hydrogen in the higher atmosphere, the part played by hydroxyl in the emissions of the nocturnal sky (emission of [OI] with 5577 Å, the emission of oxygen [OI] with 6300 Å, the emission of NaI, the continuum, emission of O_2). Summary: A survey of the present stage of the problem of the nature of emissions in the higher atmosphere made it possible to clear up unknown circumstances which render the development of a final theory difficult. What is most important is the exact determination of desactivation probability in collisions of the excited states of the atoms and molecules and especially of molecules of oxygen and hydroxyl, which are excited by oscillation, in the ground state. The same amount of importance must be attached to the final determination of the probability

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The Formation of the Hydroxyl System in the Radiation of the Nocturnal Sky. 53-4-3/11

of the desactivation (by radiation) of the oscillation-excited hydroxyl in the ground state. The increase of the concentration of atomic hydrogen tends to confirm the hypotheses developed by H. S. Heaps and G. Herzberg (reference 13) and I. S. Shklovskiy (references 12, 14). There remains a certain arbitrariness in the assumption concerning the tropospheric origin of hydrogen in the upper atmosphere. A cosmic origin of hydrogen in the upper atmosphere is not quite impossible. The degree of dissociation of hydrogen in an altitude of 75 km needs further explanation. The author at present sees no reason why the O_2^+ hypothesis should be rejected.

There are 1 table, and 39 references, 9 of which are Slavic.

AVAILABLE: Library of Congress.

Card 2/2

Krasovskiy, V. I.
AUTHORS:

Krasovskiy, V. I., Shklovskiy, I. S.

20-2- 9/50

TITLE:

The Possible Influence Exercised by the Explosion of Supernovae on the Development of Life on the Earth (Vozmozhnoye vliyaniye vspyshek sverkhnovykh na evolyutsiyu zhizni na zemle)

PERIODICAL:

Doklady AN SSSR, 1957, Vol. 116, Nr 2, pp. 197 - 199 (USSR)

ABSTRACT:

It is at present considered to be proved fact that radio-frequency radiation and also optical radiation (with continuous spectrum) of the crab-shaped nebulae is caused by relativistic electrons which move in magnetic fields. Therefore, these nebulae (the remainder of the supernovae explosion of 1054) probably contain an enormous quantity of relativistic particles, i.e. of primary cosmic rays. This is true also for all other nebulae that are remainders of supernovae explosions. Recently also a radio-frequency radiation of the fibrous nebulae in the Bear were observed, which are without doubt, remainders of supernovae explosions which took place several thousand years ago. In such nebulae the concentration of the primary cosmic particles is probably 30 to 100 times as great as near the earth. It is quite possible that the sun with its planets may enter such a domain with increased concentration of primary particles as

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20-2-9/50

The Possible Influence Exercised by the Explosion of Supernovae on the Development of Life on the Earth

a result of its motion within the galaxy. This happens whenever supernovae explode in the immediate neighborhood of the sun. The author is of the opinion that the number of supernovae explosions in our galaxy is abnormally large (within the last thousand years 1006, 1054, 1572, 1604 and 1843). Every 1000 years a supernovae probably explodes in a distance of at the most 1000 parsec, and every 200 million years in a distance of at the most 8 parsec. The hard radiation (e.g. X-ray radiation) which reached the earth as a result of these explosions and the nebulae resulting therefrom (in the first stage of development) was probably considerably greater than the hard radiation of the sun. There may have been epochs of many hundreds of years during which cosmic radiation was a hundred times stronger than it is today. This could have had serious biological and, above all, genetical consequences. In order to double the mutation frequency of the long-lived genera, the intensity of cosmic radiation need only to be doubled or trebled. Therefore, a thousand years' intensification of cosmic radiation by several dozens of its former amount must produce devastating consequences for relatively long-lived kinds. Also the great "dying-out" of reptiles at the end of the cretaceous period might be due

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The Possible Influence Exercised by the Explosions of Supernovae on the Development of Life on the Earth

to such a cause. However, the intensification of cosmic radiation is probably of advantage for the development of other animals and also some plants. Perhaps also the creation of complicated complexes and of the life of simple organic compounds was caused by hard radiation. There are 8 references, 3 of which are Slavic.

ASSOCIATION: Institute for Physics of the Atmosphere AN USSR
(Institut fiziki atmosfery Akademii nauk SSSR)

PRESENTED: May 9, 1957, by I. Ye. Tamm, Academician

SUBMITTED: April 29, 1957

AVAILABLE: Library of Congress

Card 3/3

KRASOVSKIY, Valer'yan Ivanovich, prof.; FAYNBOYM, I.B., red.; TROFIMOV, A.V..
tekhn.red.

[Studying the upper atmosphere with the help of artificial
satellites and rockets] Issledovaniia verkhnei atmosfery s
pomoshch'iu iskusatvennykh sputnikov i raket. Moskva, Izd-vo
"Znanie," 1958. 29 p. (Vsesoiuznoe obshchestvo po rasprostra-
neniu politicheskikh i nauchnykh znani. Ser. 8, vyp. 2, no.5)
(Atmosphere, Upper--Rocket observations) (MIRA 12:2)

KRASNOVSKIY, V. I.

"Exploration of the Upper Atmosphere with the Help of the Third Soviet
Sputnik."

report presented at Intl. Astronautical Congress, Amsterdam, Netherlands, 25-29
Aug 1958.

KRASOVSKIY, V. I.

"Ionospheric Investigations in the USSR," paper presented at 10th General Assembly, Int'l Astronomical Union, Moscow, Aug 1958.

KRASOVSKIY, V. I. and SHKLOVSKIY, I. S.

"The Possible Influence of a Supernova Explosion on the Development of Life on Earth."

Physikalische Blatter, April 1958.

FRASOVSKIY, V.I.

Soviet exploration of the ionosphere by rockets and artificial
earth satellites. Isk.sput.Zem. no.2:36-49 '58.

(MIRA 12:5)

(Atmosphere, Upper--Rocket observations)

(Artificial satellites)

3(1)

AUTHOR: Krasovskiy, V.I.

SOV/33-35-2-5/21

TITLE: The Characteristic of the Properties of Solar Corpuscular Emission From Spectra of Aurorae (Kharakteristika svoystv korpuskulyarnogo izlucheniya solntsa po spektram polyarnykh siyaniy)

PERIODICAL: Astronomichesk'iy zhurnal, 1958, Vol 35, Nr 2, pp 222-226 (USSR)

ABSTRACT: The author compares several observations and theories relating to aurorae, especially he mentions the paper of I.S.Shklovskiy [Ref 5]. The spectra of aurorae show that low latitude aurorae in comparison to high latitude aurorae are excited by corpuscles with shorter paths. Here corpuscles are all elements existent on the Sun and in the interplanetary space. The spectrum of aurora measured on January 21, 1957 in Moscow, causes the author to assume that the emission observed thereby was caused by a recharge of neutral nitrogen atoms with a hell of corpuscular streams, where the rule

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The Characteristic of the Properties of
Solar Corpuscular Emission From Spectra
of Aurorae

SOV/33-35-2-5/21

$N(^4S) + He(^2S) \rightarrow N(^3D) + He(^1S)$ was fulfilled.

There are 13 references, 5 of which are Soviet, 5 English,
2 Indian, and 1 German.

ASSOCIATION: Institut fiziki atmosfery Akademii nauk SSSR (Institute of
Atmospheric Physics of the AS USSR)

SUBMITTED: May 18, 1957

Card 2/2

KRASOVSKIY, V.I.; KUSHNIR, Yu.M.; BORDOVSKIY, G.A.; ZAKHAROV, G.F.;
~~SVETITSKIY, Ye.M.~~

Detection of corpuscles by the third artificial earth satellite.
Isk.sput.Zem. no.2:59-60 '58. (MIRA 12:5)
(Artificial satellites)
(Solar radiation--Observations)

3(1)

AUTHOR: Krasovskiy, V.I.

30V/33-35-6-1/18

TITLE: Cold Interstellar Gas and Light Absorption

PERIODICAL: Astronomicheskiy zhurnal, 1958, Vol 35, Nr 6,
pp 825 - 828 (USSR)

ABSTRACT: In a cold interstellar gas the ions are surrounded, according to the author, by envelopes of neutral molecules. On these envelopes an intense recombination process of atoms into molecules takes place, combined with the formation of negative ions. The author gives an estimation of the concentration of the negative ions, which turns out to be high enough, in particular for molecular oxygen, in order to explain the observed light absorption. Also, the interstellar polarization of stellar radiation can be explained by the effect of the negative ions.

There are 3 references, 1 of which is Soviet, and 2 are American.

ASSOCIATION: Institut fiziki atmosfery Akademii nauk SSSR (Institute of Atmospheric Physics of the AS USSR)

SUBMITTED: May 13, 1958

Card 1/1

AUTHORS: Krasovskiy, V. I., Kushnir, Yu. M., 53-64-3-2/8
Bordovskiy, G. A.

TITLE: The Investigation of Corpuscular Radiation of the Sun by Means of an Artificial Earth Satellite (Issledovaniye korpuskulyarnogo izlucheniya Solntsa s pomoshch'yu iskusstvennogo sputnika Zemli)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 3, pp. 425-434 (USSR)

ABSTRACT: First the authors give a survey on the present stage of the problem of corpuscular sun radiation, and they also report on earlier works dealing with the same subject. An artificial satellite can be used for the investigation of corpuscular sun radiation in two different ways. First, the chemical composition of corpuscular flux can be determined directly by mounting a special mass-spectrometer on the satellite. Such apparatus can be constructed. The most effective method of registration, however, is connected with a photographic process; this makes necessary a special construction of the satellite

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The Investigation of Corpuscular Radiation of the Sun by Means 53-64-3-2/8
of an Artificial Earth Satellite

and the material obtained must be brought down to earth. Besides, a strict orientation of the apparatus in a certain direction would be necessary. The second possibility which can be realized at present is the investigation of the distribution and the penetration of the corpuscles at various geomagnetic longitudes and latitudes, especially during the day. This makes possible a checking of the various hypotheses on the nature of corpuscular flux. The apparatus projected and being built for this purpose is shown in a diagram. A fluorescing screen serves as an indicator of the corpuscles. The radiation of the fluorescent screen is registered by a photocell, and then the photoelectric current is amplified, stored, and transferred by a corresponding radio-telemetric apparatus. A metal foil fixed in front of the fluorescent screen makes possible a coarse estimation of the ranges of corpuscles and moreover it protects the fluorescent screen and the photocell against the direct action of sun radiation. A shutter restricts the angle of the action of corpuscles. The apparatus described here can at the same time be used with apparatus for the inve-

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The Investigation of Corpuscular Radiation of the Sun by Means 53-64-3-2/8
of an Artificial Earth Satellite

stigation of x-radiation of the sun and the micro-meteorites.
The soft corpuscular radiation of the sun can be determined
only without metal foils at night when there is no sunlight.
In using it this way, the apparatus can be switched-on or
off by a special control signal of the present course
device. There are 5 figures and 38 references, 11 of which are
Soviet.

1. Sun--Radiation-- 2. Particles--Photographic analysis 3. Satellite
vehicles--Applications 4. Interstellar matter--Analysis

Card 3/3

007/06-58-12-12/11

AUTHOR: Krasovskiy, V.I., Doctor of Physical and Mathematical Sciences

TITLE: The Exploration of the Upper Atmosphere by Means of the Third Artificial Satellite of the Earth (Issledovaniye verkhney atmosfery pri pomoshchi tret'yego iskusstvennogo sputnika zemli)

PERIODICAL: Priroda, 1958, Nr 12, pp 71-78 (USSR)

ABSTRACT: The article is a revised text of the paper read in the name of the Soviet researchers at the 9th Congress of the International Astronautical Federation in Amsterdam (Holland) in August 1958. Every new Soviet artificial satellite had a wider and somewhat different scientific mission and a more perfect set of scientific apparatus and devices than its predecessor. In the field of apparatus, the experience gained by means of the three Soviet artificial satellites was valuable for the development of much improved memory systems, radiotelemetric setups and methods of energy supply for extremely complex scientific research devices. Solar generators which are to provide the laboratories installed in the artificial satellites with sufficiently long-lasting

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200/26-59-12-12/44

The Exploration of the Upper Atmosphere by Means of the Third Artificial Satellite of the Earth

operating power were tried out. Several problems concerning the temperature within and on the outside of these satellites were solved. The sources of the heat energy of the upper atmosphere in connection with the microwave radiation of atomic oxygen slightly above 100 km altitude and other formerly largely hypothetical matters of different nature in higher altitudes, radiation of the nocturnal sky, crepuscular emissive flashes, aurora polaris, micrometeoritic showers, the ionosphere, and the shifting magnetic field of the earth were research objects for the satellite laboratory. Other formerly insufficiently known phenomena, such as the allotropic composition of the upper atmosphere, the diffused distribution of molecules and atoms in the gravitation field of the earth, the nature of ions, the distribution of ionization with respect to altitude and the sources of ionization of the upper atmosphere should find an explanation through the data obtained by the third sputnik (Fig. 1). Evaluation of the obtained data will take some time and only a few preliminary results are available at present. So far it has become evi-

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004/26-53-12-12/44

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dent that the rocket model of the atmosphere developed in the USA is correct only to an altitude of 100 km. Important data on the density of the atmosphere within manometers has been obtained. Thus the density of the atmosphere at an altitude of 260 km is 10 billions less than on the earth's surface, and still almost 1,000 times less at an altitude of 355 km. The third artificial satellite also contained a mass spectrometer of the Penet type for the determination of the nature of atmospheric ions with a mass number from 6 to 50 units. It had been tried out in rockets before. At an altitude of over 250 km there are mainly atomic ions of oxygen and nitrogen with the former prevailing and the latter being only a few percentages of the former. In 1 cubic cm the electronic density at an altitude of 290 km is 1.8×10^6 , at 475 km 1.0×10^6 (Fig. 2). For the determination of positive ions, the third artificial satellite contained two reticulated spherical ion traps (Fig. 3) located on diametrically opposed sides of the satellite surface and an electric block of two amplifier-converters and a generator of sawtooth

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000/26-56-12-12/44

The Exploration of the Upper Atmosphere by Means of the Third Artificial Satellite of the Earth

pulses of the voltage (Fig. 4). On 15 May 1959, 5 to 6 hours after high noon in mean latitudes, the negative potential of the hull of the satellite with respect to the medium was equal to 6.4 volts at an altitude of 795 km. Such a potential exists at an effective electron temperature of not less than $15,000^{\circ}$ K. The concentration of positive ions determined by the current, corresponding with the zero potential of the envelope of the trap with respect to the plasma, equals 1.8×10^5 ions in one cubic cm. On the same date under the same circumstances the number of ions equaled 5.2×10^5 per cubic cm at 1 to 2 hours before high noon at an altitude of 242 km with a negative potential of the satellite hull equalling approximately 2 volts and an effective electron temperature of about $7,000^{\circ}$ K. Also such extraterrestrial agents as the hard electromagnetic X-ray and gamma radiation of the sun and the universe were investigated and the detection of electron corpuscular currents of high intensity was attempted experimentally. A special device for the indication of hard electrons (Fig. 5) was built of two silver-

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SOV/26-58-12-12/44

The Exploration of the Upper Atmosphere by Means of the Third Artificial Satellite of the Earth

activated zinc sulfide fluorescent screens of different thickness covered by aluminum foil. Three aluminum diaphragms of 5 mm thickness with an inlet opening taking up corpuscles from a solid angle of $1/4$ steradian were placed in front of the screens which had a diameter of 5 cm. The radiation of the fluorescent screens was recorded by photoelectronic multipliers. The electric signals obtained by means of the multipliers were fed to a memory device and were then transmitted radiotelemetrically to the earth. Intensive signals were recorded during a magnetic perturbation on 15 May 1958. The signal was more intensive over high latitudes than over equatorial regions and at high altitudes rather than at low ones. The signals set in and ceased suddenly for a period of approximately one second; their intensity changed constantly. The apparatus for the recording of micrometeoritic impacts (Fig. 6) consists of ballistical piezo transducers, ammonium phosphate, and an amplifier-transformer. The piezo transducers measure pulses within the range from 10^{-1} to 10^3 grams x cm x sec⁻¹. This includes the recording of particles

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The Exploration of the Upper Atmosphere by Means of the Third Artificial Satellite of the Earth

with a mass from 10^{-9} grams and more. Such devices, installed on rockets, have recorded a number of about 50 micro-meteoritic impacts on 1 square m in 1 second at an altitude between 140 and 300 km. The magnetometric data recorded by a special device on the third artificial satellite is numerous and is still under evaluation. Further, more detailed research results on the upper atmosphere will be obtained by means of still more perfect artificial earth satellites. There are 4 photos, 2 diagrams, 1 graph and 2 Soviet references.

ASSOCIATION: Institut fiziki atmosfery AN SSSR, Moskva (The Institute of the Physics of the Atmosphere of the AS USSR, Moscow)

Card 6/6

RECEIVED - 1944, 10, 10

"Spectral, Electrophotometric and Radar Research on Auroras and High Airglow".

Moscow. Izdatel'stvo Akademii Nauk SSSR, 1959.

KRASOVSKIY, V.I.

"Results of Scientific Investigations Made by Soviet Sputniks
and Cosmic Rockets."

report presented at the 14th Annual Meeting of American Rocket Society, Wash, D.C.
16-20 Nov 59.

Some preliminary remarks on the problems of cosmology, 6th, 1971.	607/5609
Trudy kosmologii...: nagablicheskaya astronomiya i kosmologiya (Transactions of the 6th Conference on Problems of Cosmology; Extragalactic Astronomy and Cosmology) Moscow, 1st-10th Aug, 1971, 279 p. Extra slides inserted. 1,500 copies printed.	
Sponsoring Agency: Akademiya nauk SSSR. Astronomicheskii Sovet.	
Editorial Board: D.A. Pribludnyy, Professor (Resp. Ed.); D.A. Vorobeyev, Professor, Corresponding Member, Academy of Sciences of the USSR; N.A. Zhuravskiy, Professor; A.L. Keldysh, Senior Scientific Associate, Academy of Sciences (Scientific Secretary); Junior Scientific Committee of Publishing House: L.V. Samoylov; Tech. Ed.: G.M. Shvachko.	
PURPOSE: The publication is intended for astronomers, geophysicists and theoretical physicists interested in general problems of cosmology.	
CONTENTS: This is a collection of reports given at the 6th Conference on the Problems of Cosmology, June 5-7, 1971. In the publication, observational data in the field of extragalactic astronomy are summarized, the data are analyzed from a theoretical point of view, and the accuracy and reliability of the data are discussed. The reports are divided into three sections: 1. Extragalactic Astronomy. 2. The Structure of the Universe. 3. Theoretical Problems. The material is presented in a systematic manner, correlated with observational data, primarily with the red-shift measure-ments. The relationship of cosmology to the theory of the formation of cos-mological elements and general thermodynamic and astrophysical problems of cosmology are also investigated. No preface is included. References accompany some of the articles.	
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KRASOVSKIY V. I.

SOV/49-59-8-7/27

AUTHORS: Krasovskiy, V. I., Shklovskiy, I. S., Gal'perin, Yu. I.
and Svetlitskiy, Ye. M.

TITLE: Detection of Electrons in the Upper Atmosphere with
Energies of About 10 keV on the Third Satellite

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya,
1959, Nr 8, pp 1157-1163 (USSR)

ABSTRACT: An account is given of the results of measurements of electron streams with energies of 10 to 40 keV. The measurements were carried out by means of two fluorescent screens covered with thin pieces of absorbing aluminium foil placed on the satellite. Their radiation was recorded by photoelectron multiplier. It was found that the stream intensity decreased sharply with a decrease of energy. The stream of energy at high latitudes during the night was observed several tens of $\text{ergs/cm}^2 \cdot \text{sec} \cdot \text{str}$. Fig 1 gives an examples of the relationship of the intensity of a stream of electrons and its equivalent energy a measured on May 15, 1958 at -42 to -54° magnetic latitude Card 1/2 in the region 1720-1880 km high over the South Pacific. ✓

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Detection of Electrons in the Upper Atmosphere with Energies of
About 10 keV on the Third Satellite

The concentric circles represent repeated values.
There are 1 figure and 26 references, 9 of which are
Soviet and 17 English.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki atmosfery
(Institute of Physics of the Atmosphere, Ac.Sc., USSR) ✓

SUBMITTED: April 3, 1959

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05235

S/049/59/000/12/009/027
E032/E592

3.9000

AUTHOR:

Shklovskiy, I.S., Krasovskiy, V.I. and Yu.I. Gal'perin

TITLE:

On the Nature of Corpuscular Radiation in the Upper
Atmosphere

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya,
1959, Nr 12, pp 1799-1806

ABSTRACT: Soviet and American investigations carried out with the aid of artificial Earth satellites have led to the discovery of an intense belt of corpuscular radiation which begins at an altitude of 400-600 km (Refs 1-4). Recent results obtained with the aid of cosmic rockets have given the spatial distribution of the intensity of the hard corpuscular radiation surrounding the Earth (Refs 5 and 6). It transpired that there are two belts of corpuscular radiation. The first belt (the inner belt) forms an equatorial ring bounded (approximately) by the geomagnetic latitudes $\pm 40^\circ$. According to Ref 6, the width of this belt is somewhat smaller. The belt has a concentration maximum at an altitude of about 3000 km (above the geomagnetic equator). The second (outer) belt extends up to 6-8 terrestrial radii and its concentration maximum is at a distance of

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EO 32/E591

On the Nature of Corpuscular Radiation in the Upper Atmosphere

3.5-4 terrestrial radii. In order to explain the origin of the belt of fast charged particles surrounding the Earth, a number of authors have put forward the neutron decay hypothesis (Refs 7-9). This is the so-called trapped albedo theory of the radiation belt. However, an analysis of the spatial distribution of the particles in the two belts excludes, in the opinion of the present authors, the albedo theory. In fact, the presence of an equatorial belt means that the particles forming this belt "avoid" moderate and high geomagnetic latitudes. Apparently this is a result of the fact that geomagnetic disturbances and polar auroras at higher latitudes remove particles from the inner belt and prevent their accumulation. This means that the equatorial belt is supplied with particles only from below, i.e. from the lower layers of the terrestrial atmosphere. On the other hand, the spatial distribution of particles in the outer belt clearly indicates an extra-terrestrial source. Again, the particles in the outer belt, once they appear in the magnetic trap at the distance of 3.5-4 terrestrial

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On the Nature of Corpuscular Radiation in the Upper Atmosphere

radii, will accumulate in this region over a longer interval of time than at the distance of 5-6 terrestrial radii since the frequency and amplitude of geomagnetic disturbances at latitudes of 50-60° are greater by a factor of several tens than in the zone of maximum repeatability of polar auroras. This explains the observed position of the maximum in the outer belt. The difference in the origin of the particles in the two belts leads also to a difference in their energies. Thus, an analysis of the spatial distribution of the particles in the two radiation belts leads to the conclusion that the main reason for the escape of particles in the outer (and apparently also in the inner) zone are geomagnetic disturbances and the associated auroras. Of course in the case of the inner belt the relevant auroras are the low-latitude auroras which are relatively rare. During geomagnetic disturbances, the normal field at high altitudes is disturbed and the particles confined in the trap can escape both into the inter-planetary space and

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E052/E591

the Nature of Corpuscular Radiation in the Upper Atmosphere

downwards into the more dense layers of the terrestrial atmosphere, thus causing polar auroras. The direction of the particles from the trap in the downward direction is suggested to be due to an electric mechanism. If during the entry of solar particles into the terrestrial atmosphere, the concentration of the density in the upper layers is of the order of the energy density of the solar wind, then the concept of a "trap" for the particles is well substantiated. The particles are trapped in the upper layers of the atmosphere and are then directed downwards into the more dense layers of the atmosphere, thus causing polar auroras. The direction of the particles from the trap in the downward direction is suggested to be due to an electric mechanism. If during the entry of solar particles into the terrestrial atmosphere, the concentration of the density in the upper layers is of the order of the energy density of the solar wind, then the concept of a "trap" for the particles is well substantiated. The particles are trapped in the upper layers of the atmosphere and are then directed downwards into the more dense layers of the atmosphere, thus causing polar auroras.

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•(c) The Nature of Congressional Jurisdiction

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On the Nature of Corpuscular Radiation in the Upper Atmosphere

charged particles as a result of the interaction of cosmic rays with the atmosphere, leading to the formation of neutrons (other than those formed in stars). Meson decays are also a source of unstable neutral particles. Another more powerful source are nuclear explosions. There are thus two sources for the inner belt, the first of which is the trapped cosmic ray albedo which can supply approximately 2×10^{22} - 2×10^{23} electrons with energy up to 780 keV and 10^{20} - 10^{21} protons with energy up to 30 MeV during a time interval of 10^6 - 10^7 sec. The second source is the nuclear explosion source, which at times can considerably increase the intensity of the hard corpuscular radiation in the equatorial belt. It is pointed out that it would be very desirable to have further data on the identification and the energy spectrum in the equatorial belt. There are 1 table and 25 references, 11 of which are Soviet, 11 English and 1 French.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki Atmosfery
Card6/6 (Ac.Sc., USSR, Institute of Physics of the Atmosphere)
SUBMITTED: April 22, 1959

3 (7), 29 (2), 29 (5)

AUTHORS: Krasovskiy, V. I., Shklovskiy, I. S., SOV/20-127-1-20/65
Gal'perin, Yu. I., Svetlitskiy, Ye. M.

TITLE: The Discovery in the Upper Atmosphere by Means of the Third
Sputnik of Electrons Having an Energy of About 10 kev
(Obnaruzheniye v verkhney atmosfere s pomoshch'yu tret'yego
sputnika elektronov s energiyey okolo 10 kev)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 1, pp 78 - 81
(USSR)

ABSTRACT: In the third Soviet sputnik (which was launched on May 15, 1958)
an experiment concerning the direct discovery of electrons of
not very high energy was carried out in the upper atmosphere
(Refs 1,2,3). It is characteristic of this experiment that
practically only electrons of some dozens of kev were recorded.
The indicators used did not react to the X-ray radiation gene-
rated by these electrons in the atmosphere and in the shell of
the sputnik. Therefore, thin fluorescence screens (ZnS, acti-
vated Ag) with 2 mg matter per 1 cm² were used. As the authors
used aluminum foils of various thicknesses as absorbers, it was
possible, besides the intensity of fluxes of electrons of not
particularly high energies, to evaluate also the "equivalent"

Card 1/3

The Discovery in the Upper Atmosphere by Means of the SOV/20-127-1-20/65
Third Sputnik of Electrons Having an Energy of About
10 kev

energy of the electrons. The limiting diaphragms fitted before the indicators warranted the recording of corpuscles within a solid angle of $1/4$ steradian. The radiotelemetric material determined furnished several results of great geophysical interest: Electrons of ~ 10 kev were detected in altitudes of from 470 to 1880 km above sea level. The lowest intensity was found over the geomagnetic equator in an altitude of ~ 1300 km above sea level. At the "equivalent" energy of ~ 20 kev its minimum amperage was estimated at 10^{-14} a. cm $^{-2}$ steradian $^{-1}$. In medium and polar latitudes (up to 60° geomagnetic latitude) an amperage of $5 \cdot 10^{-11}$ a. cm $^{-2}$ steradian $^{-1}$ and sometimes also of more than 10^{-10} a. cm $^{-2}$ steradian $^{-1}$ is usual for electrons with an equivalent energy of 12 kev by night. With the construction of the measuring apparatus, such high intensities were not expected. Therefore, the intensities exceeded the apparatus scale, and the intensity and "equivalent" energy of the electrons recorded could not be evaluated. A diagram shows the dependence

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The Discovery in the Upper Atmosphere by Means of the Third Sputnik of Electrons Having an Energy of About 10 kev SOV/20-127-1-20/65

of the electron fluxes on their "equivalent" energy within the range of from -42 to -54° geomagnetic latitude in altitudes of from 1720 to 1880 km in the night of May 15, 1958 above the southern part of the Pacific. When the sputnik rotated round its two axes, the intensity of the electron fluxes changed considerably. The electron fluxes are probably the cause of the heating and expansion of the upper atmosphere (which was deduced from the slowing-down of the sputnik). There are 1 figure and 17 references, 9 of which are Soviet.

ASSOCIATION: Institut fiziki atmosfery Akademii nauk SSSR (Institute for the Physics of the Atmosphere of the Academy of Sciences, USSR)

PRESENTED: April 14, 1959, by A. I. Berg, Academician

SUBMITTED: April 14, 1959

Card 3/3

KRASOVSKIY, V. I.
KRASOVSKY, V. I.

ON THE NATURE OF HARD CORPUSCLES IN THE UPPER ATMOSPHERE
I.S. Shklovsky, V.I. Krasovsky, Yu.I. Galperin, Ye. M. Svetilitsky

1. Investigations conducted by Soviet and American artificial earth satellites have led to the detection of a region of intensive corpuscular radiation commencing at an altitude of several hundreds of kilometres and consisting of two "belts".
 2. An analysis of the spatial distribution of these belts permits drawing certain conclusions concerning the mechanisms of generation and "escape" of hard corpuscles.
 3. An analysis is given of the relationship between aurorae and streams of solar corpuscles, on the one hand, and the energy spectrum and concentration of hard corpuscles in the outer "belt", on the other.
 4. Calculations are made on the generation of hard corpuscles in the inner "belt" on the basis of the mechanism of decay of albedo neutrons.
 5. There is given an analysis of other possibilities of generation of hard corpuscles in the upper atmosphere. Investigations of High-Energy Heavy Nuclei in the Primary Cosmic Radiation Close to the Geomagnetic Equator (Guam, Marianas Islands) D. M. Hakin, P. L. Jain, E. Lohrmann, Marce Schein and M. Teucher.
- In a large stack of nuclear emulsion exposed to the cosmic radiation at 102,000 feet near the geomagnetic equator, 540 tracks of high-energy heavy nuclei were located in a systematic scan and followed along the track.
- Report presented at the International Cosmic Ray Conference, Moscow, 6-11 July 1959

KRASOVSKIY, Y.I., doktor fiz.-matem.nauk, otv.red.; FEL'DSHTAYN, Ya.I.,
red.; SIMKINA, G.S., tekhn.red.

[Spectral, electrophotometric, and radar observations of auroras
and airglow; collection of articles] Spektral'nye, elektrofoto-
metricheskie i radiolokatsionnye issledovaniya poliarnykh siliy
i svecheniya nochnogo neba; sbornik statei. IV razdel programmy
MGU (poliarnye siliy i svechenie nochnogo neba). Moskva.
No.2/3. 1960. 69 p. (MIRA 13:12)

1. Akademiya nauk SSSR. Mezhdunarodnyy komitet po provedeniyu
Mezhdunarodnogo geofizicheskogo goda.
(Auroras) (Night sky)

KRASOVSKIY, V. I., USSR.

"Research of the Upper Atmosphere and Interplanetary Gas with the Help of Artificial Satellites of the Earth and Space Probes."

report submitted at the 11th International Astronautical Federation Congress ~~ff~~
in Stockholm, 15-20 August 1960.

PLEASE ! BOOK EXPLORATION

International Comic Day Conference. Moscow, 1993.

Proceedings, v. III. Moscow, 1960. 253 p. Errata slip inserted. No. of copies printed not given.

Sponsoring Agency: International Union of Pure and Applied Physics. Comic
Ray Commission.

Ed.: S. I. Syrovatskiy Editorial Board: G. B. Eshakov (Ed.-in-Chief), I. P. Ivanenko (Assistant Ed.-in-Chief), S. M. Gerasimov, A. Z. Shiklov, V. I. Sazonov, A. A. Eremov, L. I. Derzhan, V. P. Pavlov, S. I. Syrovatskiy, V. M. Fedorov, Yu. B. Pavlov, and A. V. Abramov.

PURPOSE: This book is intended for physicists, astronomers and other scientists concerned with the earth's radiation belts and cosmic ray research.

CONTENTS: This is Volume 3 of a 4-volume work containing the proceedings of the Moscow Comic Ray Conference held July 6-11, 1959. This volume contains 40 reports on the earth's radiation belts and primary cosmic radiation. The reports delivered by Soviet scientists are abstracted below. References accompany individual reports.

9. Enneovskiy (Enneovskiy), V.I., - S. Shklovskiy (Shklovskiy), G. L. Uspikhi, and K.M. Sverkhovskiy (Sverkhovskiy). On Fast Turbulence of the Upper Atmosphere

This paper presents experimental data on fast compression of the upper atmosphere and gives a detailed description of the equipment used in the experiment.

11. Boyd, L. L. On the Problem of the Nature of Soft Radiation in the
Upper Atmosphere. 74-80

This paper summarizes the available data on bursts of soft radiation in the atmosphere and investigates the nature of the bursts in relation to processes on the sun, in corpuscular streams, and in the interplanetary medium. It also investigates the nature of these bursts in relation to the properties of the Earth's helios of radiation.

12. Ashar'ya's O. A. On the Nature of the External Radiation Belt of the Earth

It is stated that the external radiation belt encircling the earth is of nuclear origin, but that the explanations of the capture and accumulation of particles by the Earth's magnetic field in the course of its local variations are not convincing as an explanation of the nature of the external radiation belt. A more convincing explanation of the observed effects is given in this manuscript.

II. PRIMARY COGNITIVE DEFICIENCY

22. Garmashchikov, A. P., and V. G. Garmashchikov (Ukrainian Physical Institute, Academy of Sciences), *Soviet Physics: Uspekhi*, Moscow 129-135. This paper explains the results obtained in experiments of the electron component of cosmic radiation in the upper layers of the atmosphere.

13. Kocharyan, N.M., G.S. Chakyan, and A.A. Chakyan. *Armenyevy*.
Spectrum of Cosmic Radiation. 1975. 136

PHASE I BOOK EXPLOITATION

SOV/946

Mikheylov, A. A., ed.

Stantsii y kosmos; sbornik statyi (Space Stations; Collection of Articles) Moscow, Izd-vo AN SSSR, 1968. 444 p. 25,000 copies printed. (Series: Akademiya nauk SSSR. Nauchno-populyarnaya Seriya)

Resp. Ed.: A. A. Mikheylov; Compiler: V. V. Fedorov; Ed. of Publishing House: Ye. M. Klyuz; Tech. Ed.: I. D. Novichkova.

PURPOSE: This book is intended both for the space specialist and the average reader interested in space problems.

COVERAGES: The book contains 73 short articles by various Soviet authors on problems connected with space travel and the launch-
ing of artificial earth satellites and space rockets. Some pos-
sibilities of the earth satellites and space rockets are also discussed. The ar-
ticles were published in the period of 1957-1960. No person-
alities are mentioned. There are no references.

II. PRELIMINARY RESULTS OF SPACE INVESTIGATION

Kasenzonov, A. A. Historical Frontier (October 4, 1958)	72
Tonchinskii, A. V. First Scientific Results of the Flight of Soviet Sputniks [March 26, 1958]	75
Soviet Artificial Earth Satellites [Pravda, October 9, 1957]	78
Rikhsenrich, V. V. Candidate of Physical and Mathematical Sciences. Automatic Laboratory in Space [November 14, 1957]	90
Krasovskii, V. I. Doctor of Physical and Mathematical Sciences. Investigation of the Upper Atmosphere With the Help of the Artificial Earth Satellites [October 10, 1957]	93
Soviet Artificial Earth Satellites [Pravda, April 27, 1958]	96
Ratnikov, Zh. V. Candidate of Physical and Mathematical Sciences. On the Way to an Understanding of the Universe [December 4, 1957]	112
Ginzburg, V. L. Corresponding Member of the Academy of Sciences USSR and L. I. Kurnosova, Candidate of Physical and Mathematical Sciences. The Sun, Cosmic Radiation, and Sputniks [November 14, 1957]	115
Serogov, K. Professor. Investigation of Outer Space [December 11, 1957]	118
Third Soviet Artificial Earth Satellite [Pravda, May 18, 1958]	124
Discoveries, Widening Knowledge About the Universe [Pravda, October 5, 1958]	153
Mitrov, B. A. Candidate of Physical and Mathematical Sciences. In Outer Space - Our Third Sputnik [July 1958]	174
Lukartov, B. V. Doctor of Physical and Mathematical Sciences. Let's Look Into Outer Space [March 22, 1956, December 11, 1957]	183
Arment'ev, V. V. Sputnik on a Photo Plate [March 1958]	188
Martynov, E. Ye. Doctor of Physical and Mathematical Sciences. Secret of the Mysteries of the Universe [May 18, 1958]	190
Poishtan, A. I. Candidate of Physical and Mathematical Sciences. Why Does the Amount of Reflected Light From the Sputniks Change? [September 12, 1958]	191
Polevov, S. M. High Altitude Laboratories [May 16, 1958]	192
Masavich, A. N. Doctor of Physical and Mathematical Sciences. Outer Space Laboratory [1958]	194
Padurov, Ye. E. Corresponding Member of the Academy of Sciences USSR. Assault on Outer Space [1958]	204
Izakov, P. Candidate of Biological Sciences. Life on the Sputnik [November 14, 1957]	214

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B015/B008

3.1810

AUTHOR: Krasovskiy, V. I., Doctor of Physical and Mathematical Sciences

TITLE: Some Problems of the Physics of the Northern Lights ✓

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, No. 5, pp. 10-16

TEXT: In the paper under review, the author restricts himself to the conclusions based on the new investigation material regarding the energetics of the upper atmosphere, and mainly the spectra of the northern lights. The investigation of the upper atmosphere by means of spectroscopic analysis was conducted in the USSR at the Institut fiziki atmosfery Akademii nauk SSSR (Institute of the Physics of the Atmosphere of the Academy of Sciences, USSR). In connection with the International Geophysical Year, these investigations were intensified thanks to the building of high-quality spectrometers, interferometers and high-speed spectroscopic electrophotometers. Nowadays, one of the basic problems of the physics of the upper atmosphere is that of the sources of its heating and ionization. On the basis of the rotation-vibration spectrum ✓

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Some Problems of the Physics of the
Northern Lights

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of hydroxyl obtained by N. N. Shefov (Fig. 1), the interference pictures of the emissions of the northern lights obtained by T. M. Mulyarchik (Fig. 2), the formation of northern polar lights (Fig. 3) and the hydrogen spectrum in comparison with the normal emission spectrum of the hydrogen of atmospheric origin, the author comes to the conclusion that a considerable part of the northern lights is caused by the penetration of electrons with energies of about 10 kev into the atmosphere. The presence of such electrons in the upper atmospheric layers was ascertained with the equipment of the third artificial earth satellite. The author underlines in conclusion that electrons with an energy of about 10 kev are present at great heights in bigger quantities, which cannot be considered as primary solar particles. Protons and electrons which produce the phenomenon of the northern lights and the heating of the upper atmospheric layers, develop as the result of a complicated interaction of the clouds of ionized gases ejected by the sun with ionized gas which is retained by the geomagnetic field. Further systematic observations of all the phenomena described are pointed out as being necessary. The continuation of the investigations which were conducted

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Some Problems of the Physics of the Northern
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during the International Geophysical Year, are of great scientific and
practical interest. There are 4 figures.

X

Card 3/3

SEDOV, L.I.; KRASOVSKIY, V.I.

Congress on Astronautics in Stockholm. Vest.AN SSSR no.12:45-46
D '60. (MIRA 13:12)
(Astronautics--Congresses)

- a. [illegible]
- b. [illegible]
Thurman, L. O.
- c. [illegible]
- d. [illegible]
GRODOWSKI, [illegible]
- e. [illegible]
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- f. [illegible]
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- g. [illegible]
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- h. [illegible]
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- i. [illegible]
[illegible]

Report to the President of the National Intelligence Community,
Washington, D. C. 1-7 6511 1-10-62

119

KRASOVSKIY, V.I., doktor fiziko-matematicheskikh nauk, otv.red.;
VERSTAK, G.V., red.; RYLINA, Yu.V., tekhn.red.

[Spectral, electrophotometrical and radar research of aurorae and night airglow; collected articles. Section 4 of the program of the international Geophysical Year (aurorae and night airglow) Spektral'nye elektrofotometricheskie i radiolokatsionnye issledovaniya poliarnykh sifanii i svecheniya nochnogo neba; sbornik statei.IV razdel prigrammy MGG (poliarnye sifanii i svechenie nochnogo neba). Moskva. [In Russian with summaries in English.] No.5. 1961. 58 p. (MIRA 14:5)

1. Akademiya nauk SSSR. Mezhdunarodnyy komitet po provedeniyu Mezhdunarodnogo geofizicheskogo goda.
(Aurorae) (Night sky)

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3.5131
AUTHOR:

33075

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D228/D305

Krasovskiy, V. I.

TITLE:

The nature of hydroxyl emission in the upper atmosphere

PERIODICAL:

Referativnyy zhurnal, Geofizika, no. 12, 1961,
23, abstract 12G184 (V sb. Spektr., elektro-
fotometr. i radiolokats. issled. polyarn.
siyaniy i svecheniya nochn. neba. no. 5. M.,
AN SSSR, 1961, 29-31)

TEXT: Some conclusions drawn on the basis of data from obser-
vations at Yakutsk and Zvenigorod during the IGY are reported on
the nature of OH emission. According to the results of the
Yakutsk observations, the intensity of OH emission grows as
the rotary temperature increases if this has a value of above
250°K. This emission is evidently connected with the ozone-

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D228/D305

The nature of hydroxyl...

hydrogen reaction. At rotary temperatures below 250°K. the intensity of hydroxyl emission does not depend on the temperature. In the latter case, the emission is due to the reaction of re-formed oscillatively-stimulated molecules of O_2 with H atoms.

The existence of two processes for the appearance of stimulated hydroxyl is also indicated by the increased relative population of the tenth oscillatory level in comparison with the fifth on the increase of the rotary temperature. The data obtained at Zvenigorod differ substantially from those obtained at Yakutsk. The Zvenigorod data do not testify to the clear dependence of the OH-emission intensity on the rotary temperature. However, the average intensities for Zvenigorod are at the level of the minimum intensities for Yakutsk at rotary temperatures of below 250°K. Therefore, it is to be supposed that the emission of OH observed at Zvenigorod has the same character as the OH emission at Yakutsk when the rotary temperature is below 250°K. The existence of two processes for the appearance of excited hydroxyl.

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The nature of hydroxyl...

is indicated, also, by the Zvenigorod data about the relative population of the tenth and sixth levels. A maximum rotary temperature of 380°K has been registered at Zvenigorod. The minimum temperatures recorded at Zvenigorod and Yakutsk are about 200°K . If the rotary temperature of hydroxyl reflects the environmental temperature, OH emission may probably arise considerably above and considerably below the temperature minimum at a height of about 80 km. In the first case, stimulated hydroxyl will arise as a result of the reaction of reformed oscillatively-excited molecules of O_2 with H; in the second case it will originate during the ozone-hydrogen reaction. The change in the temperature of the atmosphere's high layers is not the sole factor determining the variations of the rotary temperature of OH. It may be supposed that the altitudinal displacement of the reaction zone is capable of creating the same variations. The tendency for the growth of the emission of H α in the night sky is noted at Zvenigorod and Yakutsk as the intensity of OH emission in-

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D228/D305

The nature of hydroxyl...

creases. This may be explained above all by the fact that hydrogen and hydroxyl emissions are proportional to the content of atomic hydrogen in the atmosphere's high layers. It is possible, however, that H₂ emission may also be stimulated by electrons with an energy of tens of electron-volts, as a result of which atomic hydrogen is formed in the lower parts of the atmosphere either directly or by means of roentgen radiation. [Abstracter's note: Complete translation.]

Card 4/4

25990

S/560/61/000/006/008/010

E032/E314

9.9100

AUTHORS: Krasovskiy, V.I., Shklovskiy, I.S., Gal'perin, Yu.I.,
Svetlitskiy, Ye.M., Kushnir, Yu.M. and
Bordovskiy, G.A.

TITLE: Discovery of Approximately 10 keV Electrons in the
Upper Atmosphere

PERIODICAL: Akademiya SSSR. Iskusstvennyye sputniki Zemli.
No. 6. Moscow, 1961, pp. 113 - 126

TEXT: Prior to experiments carried out with the aid of
artificial Earth satellites, it was assumed that the natural
glow, heating, and ionization of the upper atmosphere was largely
due to hard electromagnetic radiation of solar origin. It was
considered that corpuscular radiation (protons, α -particles and
electrons) could only penetrate the atmosphere in the polar
regions and thereby give rise to geomagnetic disturbances and
aurorae. It was found that aurorae were frequently initiated
by protons with a considerable velocity spread. However, in
many cases, hydrogen-emission was not observed and the appearance
of aurorae was provisionally associated with electrons having
Card 1/7

X

25990

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EO32/E314

Discovery of

energies up to a few hundreds or thousands of eV. An attempt was then made by Krasovskiy et al (Ref. 3 - UFN, 64, 425, 1958) to detect these electrons from the third Soviet artificial Earth satellite. The apparatus employed consisted of two very thin phosphors covered by aluminium foils. The scintillations were recorded by photomultipliers and the amplified photo-multiplier signal was stored and later telemetered to Earth. Owing to the presence of the aluminium foils (which were of differing thicknesses) it was possible to estimate both the intensity and the energy of the electrons which were most effective in exciting the phosphors. A particular feature of this apparatus was that it was sensitive only to electrons and did not respond to protons and photons of comparable energy. The apparatus indicated the presence of large electron currents at altitudes up to 900 km in the region of the southern part of the Pacific Ocean, the energy of these electrons being of the order of 10 keV. These currents were often so large that the apparatus gave off-scale readings since such high currents were not expected. In the case of these off-scale readings the energy

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EO32/E314

Discovery of

flux exceeded $100 \text{ erg cm}^{-2} \text{ sec}^{-1}$ at altitudes up to 1 900 km from the Earth's surface. Fig. 2 shows the calibration curves for the two detectors employed in this experiment. The dashed lines correspond to aluminium foil of $0.8 \times 10^{-3} \text{ g/cm}^2$ and the continuous lines correspond to aluminium foil of $0.4 \times 10^{-3} \text{ g/cm}^2$. The numbers on these lines indicate the energy of the electrons in keV. These calibration curves were obtained in laboratory experiments using parallel beams of mono-energetic electrons. The current density of monochromatic electrons (A/cm^2) is plotted along the vertical axis and the telemetric channel number, which is proportional to the logarithm of the photomultiplier current, along the horizontal axis. Fig. 3 shows the difference ΔK between the logarithmic-scale divisions of the two detectors as a function of the energy of the electrons used in the calibration. The ratio of the photo-currents of the two detectors depends on the energy of the electrons or, more precisely, on the form of the energy spectrum. This relation was determined in Card 3/7

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EO32/E314

Discovery of

preliminary laboratory experiments with mono-energetic electrons. The form of the energy spectrum recorded by the satellite is unknown and comparison of the readings produced by the two detectors can only be used to estimate an equivalent energy. This equivalent energy E_{equiv} is defined as the energy of a monochromatic beam which gives the same photo-current ratio for the two detectors as the observed value. Proceeding along these lines one can also define an equivalent current and an equivalent energy flux. It can easily be shown that these equivalent quantities give, in fact, the lower limits of the measured quantities. Consideration of the telemetric records, a number of which are reproduced in the present paper, showed that the most frequently recorded energies occurred in the neighbourhood of 14 keV. Since the sensitivity of the apparatus is considerably higher for high-energy electrons, it follows that in the case of non-monochromatic electrons the maximum flux corresponds to an energy below 14 keV. This maximum can be determined if some energy-distribution function

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E032/E314

Discovery of

is assumed. It is estimated that the energy flux associated with these currents, which may reach the lower layers of the atmosphere, is at least $1 \text{ erg cm}^{-2} \text{ sec}^{-1}$. The discovery of large currents of 10 keV electrons is of particular importance to the understanding of many geophysical phenomena. For example, it is interesting to note that appreciable intensities of such electrons first appear at the geomagnetic latitude at which increased ionization was previously recorded in the F-layer and which could not be explained by hard electromagnetic radiation of solar origin. The existence of these electron currents may lead to the explanation of ionization irregularities in the upper atmosphere. Acknowledgments are made to S.Sh. Dolginov, V.V. Beletskiy and Yu.V. Zonov for determining the orientation of the apparatus relative to the magnetic field. There are 11 figures and 15 references: 12 Soviet and 3 non-Soviet.

SUBMITTED: December 9, 1959

Card 5/7

S/025/61/000/010/003/003
D264/D304

AUTHOR: Krasovskiy, V. I., Doctor of Physics and
Mathematics

TITLE: Prospects near and far. Astronautics and extra-
terrestrial civilizations

PERIODICAL: Nauka i zhizn', no. 10, 1961, 81 - 90

TEXT: The article reviews some of the prospects and problems posed by the dawn of space travel. The author envisages the advent of automatic and manned space stations for long-distance radio communication and weather forecasting. Observatory satellites or observatories on the moon and other atmosphereless planets and asteroids will vastly extend the scope and clarity of astronomy. Coupled radio antennas on different cosmic bodies will give a radio receiving system of tremendous resolving power. Professor I. S. Shklovskiy once noted the anomaly of the gradual reduction in the period of rotation of Phobos,

Card 1/4

Prospects near and far.

S/025/61/000/010/003/003
D264/D304

the Martian satellite. Calculation made at the time indicated that Phobos must have appeared in the field of Martian gravitation only a few hundred million years ago and will eventually fall onto the planet's surface. According to modern cosmogony, Mars originated several billion years ago; Shklovskiy consequently assumed that Phobos is an artificial satellite, launched by a race of Martians now extinct. The two theories of Mars' origin are discussed. 1) The planet was formed from the condensation of hot gases. Life could have developed hundreds of millions or a billion years before it did on earth. Subsequently, such vital gases as oxygen and water vapor escaped because of Mars' low gravity. 2) Mars originated via amalgamation from collisions of cold meteorites. The temperature is rising gradually, but lags behind that of the Earth which is nearer to the sun's warmth. Only in the future will conditions be suitable for the development of life. If there was once life on Mars, the author

Card 2/4

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D264/D304

Prospects far and near.

assumes that the Martians would have developed a vast underground civilization as conditions on the surface deteriorated. Professor N. A. Kozyrev believes that primitive life may exist on Venus. To test the planet's true thermal regime, some scientists advocate seeding the Venetian atmosphere with rocket-borne terrestrial algae. If the temperature is favorable, the algae would multiply rapidly on the CO₂ and within a few years would transform the atmosphere. Since the effect of terrestrial microorganisms on other worlds is not known, most scientists advocate thorough sterilization of spaceships and their equipment. The advantages and disadvantages of photon rockets are discussed. Since the time intervals involved in interstellar photon-rocket travel are so great, such rockets will be of little use for reconnaissance work. Collision with particles of interstellar gas and dust clouds would also be catastrophic and special beams or fields would be required to repel such particles from the photon rocket. The author argues that the universe may be inhabited

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Prospects far and near.

S/025/61/000/010/003/003
D264/D304

by intelligent beings who are trying to contact us through some form of radiotelegraphy. Some scientists advocate the launching of numerous small rockets with tape recordings of terrestrial data and radio transmitters to try to establish contact with intelligent life on other planets.

Card 4/4

KRASOVSKIY, V.I., doktor fiziko-matem. nauk, otv. red.; SHCHUKINA, Ye.P.,
red.; TIKHOMIROVA, S.G., tekhn. red.

[Spectral, electrophotometric, and radar investigations of
auroras and the airglow; collection of articles] Spektral'-
nye, elektrofotometricheskie i radiolokatsionnye issledova-
niia poliarnykh silanii i svechenia nochnogo neba; sbornik
statei. IV razdel programmy MGG (poliarnye silaniia i svechenie
nochnogo neba). Moskva, Izd-vo Akad. nauk SSSR. No.6. 1961. 41 p.
(MIRA 14:12)

1. Akademiya nauk SSSR. Mezhdunarodnyy komitet po provede-
niyu Mezhdunarodnogo geofizicheskogo goda.
(Auroras) (Night sky)

KRASOVSKIY, V.I.

Letter to the editor. Izv. AN SSSR. Ser. geofiz. no.12:1898-1900
D '61. (MIRA 14:12)

(Night sky)

30398

3.1810

3.5120

S/053/61/075/003/003/005
B125/B104

AUTHOR: Krasovskiy, V. I.

TITLE: Some results of investigations of aurora borealis and night-sky radiation during the International Geophysical Year and International Geophysical Cooperation

PERIODICAL: Uspekhi fizicheskikh nauk, v. 75, no. 3, 1961, 501 - 525

TEXT: This article describes observations of polar phenomena and night-sky radiation, made at Loparskaya, Roshchino, and Svenigorod during the International Geophysical Year and the International Geophysical Cooperation. The following Soviet authors are mentioned: N. V. Dzhordshio ("Spektral'nyye, elektrofotometricheskiye i radiolokatsionnyye issledovaniya polarnykh siyaniy i svecheniya nochnogo neba" M., izd. AN SSSR, briefly referred to as "Sbornik") has shown that sharply outlined, bright formations produce only part of the radiation. In most cases, the integral radiation of the surrounding background is more intense. The term "absence of a polar phenomenon" (aurora borealis) in high and low latitudes and 1/4

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Some results of investigations of aurora...

S/053/61/075/003/003/003
B125/B104

should be completely revised. V. S. Prokudina (Sbornik no.1, 30 (1959)) recorded hydrogen emission with a narrow contour in night-sky spectra. Yu. I. Gal'perin, N. N. Shefov, F. K. Shuyskaya et al. observed hydrogen emissions, H_{α} and H_{β} , with broad contours. The intensities of hydrogen emission in the magnetic zenith and on the horizontal white screen are equal in virtually all cases. According to O. L. Vaysberg (Izv. AN SSSR, ser. geofiz., No.8, 1277 (1960); No.1, 166 (1961)), hydrogen emission is never intensified in bright formations near the zenith. According to I. S. Shklovskiy (DAN SSSR 81, 367 (1951), Ann. Geophys. 14, 414 (1958)), the protons approaching the earth are converted into neutral hydrogen already in the interplanetary space. According to Yu. I. Gal'perin, hydrogen emission takes place prior to the occurrence of auroras and during all their stages. According to Yu. I. Gal'perin and O. L. Vaysberg, hydrogen fields stretch over hundreds and thousands of kilometers. The spectra of diffuse auroras in the visible range without hydrogen emission do not differ from the spectra of other sharply outlined forms. According to F. K. Shuyskaya (Izv. AN SSSR, ser. geofiz., No.3, 510 (1960); Sbornik No.5, 49 (1961)), B. P. Pctanov, Z. Ts. Rapoport, and T. B. Borsuk (Sbornik No.2-3, 42 (1960)), the intensive absorption of cosmic radio radiation occurring

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30398
S/053/61/075/003/003/005

Some results of investigations of aurora...B125/B104

at a frequency of 31 Mc/sec is indicative of an increase in ionization in the D layer. According to T. M. Milyarchik (DAN SSSR, 130, 303 (1960)), the temperature of red auroras may reach 3500°K. A. V. Mironova, V. S. Prokudina, and N. N. Shefov (Sbornik no.1, 20 (1959)) discovered an infrared helium emission in auroras at 10830 Å. This observation was confirmed by N. I. Fedorova (Sbornik no.5, 42 (1961)). According to V. P. Shcheglov (Astron. zh. 38, no.6, III (1961)), the helium emission at dawn is particularly strong. In Yakutsk N. N. Shefov and V. I. Yarin collected many emission spectra of the night-sky radiation from 3000-12,000 Å. According to N. N. Shefov, V. I. Yarin, and V. S. Prokudina, the emissions of night-sky radiation can be divided into two groups: 1) the green 5577-Å radiation of atomic oxygen and 2) the radiations of hydroxyl, the yellow radiation (5894 Å) of sodium, the hydrogen radiation (H_{α}), and the red radiation of atomic oxygen. ✓

According to A. V. Minorov (Sbornik no.2-3, 66 (1960)), the intensity of various emissions increases with increasing magnetic K index. The excited hydroxyl is produced by various chemical reactions in the upper atmosphere. Each of these reactions yields a characteristic relative

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30328

S/053/61/075/003/003/005

Some results of investigations of aurora...B125/B104

excitation of the vibration levels of hydroxyl. The nature of hydroxyl radiation will be investigated in later studies. There are 5 figures and 60 references: 41 Soviet and 19 non-Soviet. The three most recent references to English-language publications read as follows: N. I. Fedorova, Planet. Space Sci. 5, 70 (1961); N. N. Shefov, Planet. Space Sci. 5, 70 (1961); L. Coleman, et al., Phys. Rev. Lett. 5, 43 (1960). ✓

Card 4/4

KRASOVSKIY, V. I.

"Chemistry of the Upper Atmosphere"

Soviet Papers Presented at Plenary Meetings of Committee on Space Research
(COSPAR) and Third International Space Science Symposium, Washington, D. C.,
23 Apr - 9 May 62.

KRASOVSKIY, Valer'yan I.

" Theory of OH excitation and the intensity-temperature relation "
Report to be submitted at the IAU and IUGG Symposium on Theoretical
Interpretation of Upper Atmosphere Emissions, Paris, France,
25-29 June 1962

1. Institute of Physics of the Atmosphere, Academy of Sciences USSR, Moscow

KRASOVSKIY, V. I.

"Some Geophysical and Astronomical Aspects of Soviet Space Research"

report presented at the 13th Intl. Astronautical Federation Congress (FAI)
Varna, Bulgaria, 23-29 Sep 1962

KRASOVSKIY, V.I., doktor fiziko-matem. nauk, otv. red.; ZHITNIKOVA,
S.A., red. izd-va; SHEVCHENKO, G.N., tekhn. red.

[Papers] Sbornik statei. Moskva, Izd-vo Akad. nauk SSSR.
(Rezultaty issledovaniy po programme Mezhdunarodnogo geofizicheskogo goda) No.9. [Auroras and night-sky light] Polyarnyye siyaniya i svechenie nochnogo neba. 1962. 61 p.
(MIRA 15:10)

1. Akademiya nauk SSSR. Mezhdunarodnyy geofizicheskiy komitet. IV razdel programmy MGG. Polyarnyye siyaniya i svechenie nochnogo neba.
(Auroras) (Night sky)

8/030/62/000/006/004/007
1023/1223

3,5120

AUTHOR: Krasovskiy, V.I., Doctor of Physics - Mathematical Sciences

TITLE: Helium in the upper atmosphere of the Earth

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 6, 1962, 50-52

TEXT: In 1947 in the USSR for the first time in the world an electronic-optical converter of infrared into visible radiation was used for the investigations of the upper atmosphere. The converter consists of a diffraction spectrograph, whose image is focused on an infrared sensitive photo-cathode. The photo electrons, accelerated by a high voltage (~ 30 KV), are focused on a fluorescent screen covered by a thin aluminium foil. A photographic plate is put directly on a thin mica screen. The photo-cathode is cooled by solid carbon dioxide in order to reduce the number of thermal electrons. With the above described apparatus a large number of spectrograms in the infrared region were measured during the International Geophysical Year. The spectrograms were taken during twilight and at night, both in ordinary conditions and during auroras. In many cases the 10830 Å emission line of helium was found. This line was

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Helium in...

S/030/62/000/006/004/007
I023/I223

never found at day or at night, even during auroras. During daytime this line is masked by the strong scattered light from the sky. N.N. Scefor found that atoms of ortho-helium can be produced from atoms of ordinary para-helium in three ways: 1) excitation by the 584Å lines of the sun's helium radiation, 2) collisions of para-helium atoms with photo-electrons, produced by the sun's shortwave radiation (less than 304Å), 3) collisions of para-helium atoms with secondary electrons, produced by collisions in the atmosphere by more energetic electrons, which cause also the auroras. The energy of these electrons is several thousands kev. Data on the infrared emission of helium measured at twilight can render information about the shortwave and corpuscular radiation of the sun. The intensity of 584Å helium line emitted by the sun was measured by rockets. Using this data, and the infrared emission of helium measured during twilight, the density of para-helium at 1000 km height was found to be 10^6 atoms/cm³. This density is close to the total density found at this height by satellites. Therefore, helium is the major component of the atmosphere at this height. The most important result is not the density of helium in the upper atmosphere, but the possibility of measuring the ionosphere-producing radiation at sea level, and not by rockets.

Card 2/2

KRASOVSKIY, V. [Krasovs'kyi, V.], doktor fiz.-matem.nauk

Prospects near and distant. Nauka i zhyttia 12 no.5:10-15
My '62.

(MIRA 15:7)

(Astronautics)
(Life on other planets)

KRASNOVSKIY, V. I.,

"Corpuscles of the upper atmosphere"

report to be submitted for the 14th Congress Intl. Astronautics Federation,
Paris, France, 25 Sep-1 Oct 63

KRASOVSKIY, V.I., doktor fiz.-matem. nauk, otv. red.; BAGARYATSKIY, B.A., kand. fiz.-matem. nauk, otv. red.; ZHITNIKOVA, S.A., red.; DOROKHINA, I.N., tekhn. red.; MATYUKHINA, L.I., tekhn. red.

[Collection of articles of the Intergovernmental Committee for the Execution of the International Geophysical Year]
Sbornik statei Mezhduevdomstvennogo komiteta po provedeniiu Mezhdunarodnogo geofizicheskogo goda. Moskva, Izd-vo AN SSSR. No.10. 1963. 153 p. (MIRA 17:2)

1. Akademiya nauk SSSR. Mezhduevdomstvennyy komitet po provedeniyu Mezhdunarodnogo geofizicheskogo goda. IV razdel programmy MGG: Polyarnyye siyaniya i svecheniye nochnogo neba.

KRASOVSKIY, V.I.

Astronautics and extraterrestrial civilizations. Kosmos no.1;
56-77 '63. (MIRA 16:8)

(Life on other planets)

ACCESSION NR: AT3007026

S/2560/63/000/017/0003/0018

AUTHOR: Krasovskiy, V. L.

TITLE: The chemistry of the upper atmosphere

SOURCE: AN SSSR. Iskusst. sputniki zemli, no. 17, 1963, 3-18

TOPIC TAGS: atmosphere, upper atmosphere, chemistry of atmosphere, chemistry of upper atmosphere, chemistry, upper-atmosphere chemistry, O, N, H, hydroxyl, hydroxyl radiation, atmospheric radiation, nocturnal sky, nocturnal-sky radiation, sky radiation, ozone

ABSTRACT: This survey-type paper, first presented at the Third Plenary Session of COSPAR at Washington, D.C., in May 1962, traces the complex molecular and iono-atomic-molecular transformations in the upper atmosphere. A literature survey of the dissociation of molecular O is cited. The impressive intensity of the hydroxyl radiation of the upper atmosphere is cited, together with literature sources thereon. It is noted that, according to the Krasovskiy hypothesis, the atomic O passes into the molecular state not as a result of the uniting of two O atoms during triple collisions, but through the formation of O₃ from molecular and atomic O during triple collisions, followed by an O₃ reaction with O atoms.

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ACCESSION NR: AT3007026

The author underscores that the metastable O molecules, incapable of deactivation through the emission of an oscillatory excitation, can be preserved over a long time interval and can stimulate various reactions with an atom-exchange-rate coefficient of the order of $10^{-10} \text{ cm}^3 \cdot \text{sec}^{-1}$. It is noted that rocket investigations have shown that the hydroxyl emission occurs in a region with substantially variable height and thickness; literature sources are adduced. Various hypotheses are discussed on the nature of the hydroxyl radiation of the upper atmosphere. A literature review is also provided on the dissociation of molecular N at elevations of 100-400 km. The author points to his hypothesis on the origin of the continuum of radiation of the nocturnal sky in a N reaction. The entire range of N-O reactions is explored. A study of the process of formation and deactivation of metastable states of atoms and molecules is regarded as indispensable. More diligent investigations of all emissions of the upper atmosphere are required for a better understanding of the complex chemical processes occurring therein. Of the greatest importance are comprehensive investigations directly within the uppermost layers of the atmosphere, at various levels, latitudes, hours of the day and night, seasons of the year, and cycles of solar activity. Simultaneous determination of the concentration of O and N molecules and atoms, hydroxyl molecules, perhydroxyl, water, atomic and molecular H, molecules of NO and NO₂, CO and CO₂, vibratorily excited molecules, and all types of ions, is needed. There is no easy road to the solution of

Card 2/3

ACCESSION NR: AT3007026

this problem. Orig. art. has 3 tables and 69 numbered equations.

ASSOCIATION: none

SUBMITTED: 23Jun62

DATE ACQ: 11Oct63

ENCL: 00

SUB CODE: AS, EL

NO REF SOV: 021

OTHER: 029

Card 3/3

L 18945-6; EMT(1)/EMT(m)/FCC(w)/FS(v)-2/BDS/ES(v) AEDC/AFFTC/ASD/
AFMDC/ESD-3 Pe-4/Pg-4/Pi-4/Pl-4/Po-4/Pq-4 TT/GW

ACCESSION NR: AP3007340

S/0293/63/001/001/0126/0131

AUTHOR: Gal'perin, Yu. I.; Krasovskiy, V. I. 92

TITLE: Study of the upper atmosphere by means of the Cosmos 3 and Cosmos 5 satellites. 1. Apparatus ✓

SOURCE: Kosmicheskiye issledovaniya, v. 1, no. 1, 1963, 126-131 ✓

TOPIC TAGS: counter, particle counter, ion counter, ion trap, electron counter, ionospheric particle, ionospheric current, satellite, Cosmos satellite, Cosmos series, Cosmos 3, Cosmos 5, geophysical study, geophysical satellite

ABSTRACT: In the first of four articles on the investigation of ionospheric charged particles by the Cosmos 3 and Cosmos 5 satellites, a detailed description is given of the particle-sensing apparatus carried on board. Three types of counters were used, covering the energy spectrum from just above thermal up to hard particles in the high-Mev range. The counters were as follows:
1) An indicator type, which consisted of a fluorescent screen laid

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ACCESSION NR: AP3007340

on a glass base and faced with a thin aluminum foil to eliminate low-energy particles, the entire assembly being housed in a cylinder. Near the cylinder aperture were two grids, one grounded to the case and the other biased at $(-)$ 40 v to block passage of thermal electrons. The fluorescent screen was isolated from the case and could have stepped voltages applied to it of 0, 0.15, 3, 6 and 11 kv in order to segregate the penetrating electrons according to energy level. Screen illumination from particle impact was detected by a photomultiplier whose output was stored and telemetered. On each satellite five such counters were mounted in various attitudes and with differing values of phosphor composition and foil thickness. 2) An ion trap, which passed both positive and negative particles above a fixed threshold level and registered their algebraic sum. This was also a tubular cylinder with a grid arrangement similar to the indicator type, i.e., two grounded grids, a third at fixed bias, and a fourth at stepped voltages of 0 to 11 kv as in the indicator-type counter. The collecting element was a silvered metal ring 0.43 cm^2 in area, whose output fed into an electrometer tube. The ring was located in the annular air gap of a permanent magnet whose field diverted any

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ACCESSION NR: AP3007340

electrons arriving at less than 5 Kev, as well as ions with similar Larmor radius. The ion trap thus could sense selected ranges of positive ions as well as electrons above 5 Kev. Two traps were used on each satellite, one with a fixed grid bias of (-)40 v, the other with a bias of +24 v. It was determined that the spurious effect of photoemission caused by solar rays striking the collector ring was small (on the order of 10^{-11} amp), which verified the suppressing action of the trap's magnetic field. 3) A standard halogen-filled geiger counter, type STS-5, which had an effective area of 4.3 cm^2 and was shielded by 3.4 g/cm^2 of lead. With the added shielding of the satellite skin this counter had a negligible response to electrons below 400 Kev or protons below 50 Mev. Sample recordings of the indicator counter are given which show modulation in electron count caused both by the stepped accelerating voltages and by the rotation of the satellite. Degradation in the Al foil was detected, apparently caused by micrometeorite erosion. A large increase in foil porosity occurred during the launch phase, due either to frequent meteorite contact while rising through the denser atmospheric layers or to sudden outgassing of

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L 18945-63

ACCESSION NR: AP3007340

the foil on entering the vacuum environment. The variations and relative orientations of the indicator and trap counters are shown in Fig. 1 of the Enclosure. Orig. art. has: 6 figures.

ASSOCIATION: none

SUBMITTED: 09May63

DATE ACQ: 21Oct63

ENCL: 01

SUB CODE: AS, GE

NO REF SOV: 003

OTHER: 001

Card 4/5

L 18946-63 EWT(1)/EWT(m)/FCC(w)/FS(v)-2/BDS/ES(v)/EEC-2 AFFTC/ASD/
 AFMDC/ESD-3/APGC Pe-4/Pi-4/Po-4/Pq-4 TT/GW 89
 ACCESSION NR: AP3007341 S/0293/63/001/001/0132/0139 88

AUTHOR: Krasovskiy, V. I.; Gal'perin, Yu. I.; Dzhordzhio, N. V.;
Mulyarchik, T. M.; Bolyunova, A. D.

TITLE: Study of the upper atmosphere by means of the Cosmos 3
 and Cosmos 5 satellites. 2. Soft particles

SOURCE: Kosmicheskiye issledovaniya, v. 1, no. 1, 1963, 132-139

TOPIC TAGS: Cosmos satellite, Cosmos 5, geoactive particle,
 ionospheric particle, ionospheric current, ionospheric field,
 ion, ion counter, particle counter, Cosmos 3

ABSTRACT: This is the second in a series of four articles on geo-
 active particle research conducted during the Cosmos 3 and Cosmos 5
 orbital flights. This article discusses the existence of currents
 of electrons and positive ions in the upper ionosphere having
 energies that are relatively low but greater than thermal. This
 was concluded from fluxes detected by the two types of particle
 counters used: 1) a sensor formed of a fluorescent screen and

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L 18946-63

ACCESSION NR: AP3007341

photomultiplier, which was biased negatively and also shielded with Al foil so as to register only electrons above 40 ev and positive ions whose free path exceeded the foil thickness (e.g., protons of the order of 200 Kev); 2) an ion trap which registered electrons of 5 Kev or more and positive ions. The trap counters showed repeated instances of anisotropic positive ion flow in a direction normal to the geomagnetic force lines; the fact that no simultaneous indications appeared in the indicator screen type counters thus suggests that these must have been "soft" positive ions; if protons, their energy would be less than 200 Kev. This conclusion is supported by the fact that when the satellite had turned 180° the indicator counters in turn registered particles not sensed by the ion traps, which were evidently electrons below 5 Kev. There thus are areas which exhibit local current flow, in which positive ion energies are estimated to be several dozen electronvolts and average density is 10^8 ion/cm²/sec/ster. These areas are in the 200- to 600-km region and tend to remain at the same earth latitudes for prolonged periods, sometimes as much as 9 hours. The authors emphasize that complete determination of the orientations of the

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L 18946-63

ACCESSION NR: AP3007341

Cosmos 3 and Cosmos 5 satellites during flight is not yet complete, but sufficient data are available to verify the above results. Additional observations are made of some high-energy particles, particularly those registered in the South Atlantic geomagnetic anomaly. If these had been positive ions, the ion trap count, being the algebraic sum of incoming particles, would have been phase opposed to the indicator count, which records the absolute sum; since, however, both counters registered such particles in phase, they must have been electrons, estimated at between 50 Kev and 1 Mev and at an omnidirectional density of $5 \times 10^7/\text{cm}^2/\text{sec}$. Regarding electron counting technique, the possibility of spurious effects caused by the fields of on-board transmitting antennas, principally that of the telemetry transmitter, is rejected since no difference in electron count was noted whether the transmitters were on or off. The intensity and anisotropy of recorded electron currents agree with earlier data from the 1958 Sputnik and from the U.S. "Injun" rocket of 1961. Fig. 1 of the Enclosure shows examples of electron intensity isolines over the South Atlantic taken by Cosmos 3. Orig. art. has: 7 figures.

Card 3/03

L 18202-63 EWT(1)/BDS/EEC-2/ES(v) AFFTC/ASD/AFMDC/ESD-3/AFGC P1-4/Po-4/
ACCESSION NR: AP3007554 ^{Pq-4/Pe-4}
GW S/0030/63/000/009/0030/0032

AUTHOR: Krasovskiy, V. I. (Doctor of physical and mathematical sciences) 79

TITLE: Auroras and night airglow 78

SOURCE: AN SSSR. Vestnik, no. 9, 1963, 30-32

TOPIC TAGS: aurora, night airglow, airglow, auroral emission, radiation belt, geomagnetic field, geoeffective corpuscle, energetic particle, ionized atmosphere, interplanetary medium, magnetohydrodynamic wave

ABSTRACT: Ground observations of auroras have established that auroral emission is excited either by electrons with an energy of about 10 Kev or by relatively low-energy protons. Highly sensitive spectiographic equipment is now capable of recording characteristic auroral emission even in the absence of visible glow. Invisible red arcs and spots have even been detected near the equatorial zone. Most of the corpuscular streams in the terrestrial atmosphere are believed to have been formed in the interaction

Card 1/2

L 18202-63

ACCESSION NR: AP3007554

between the ionized atmosphere in the geomagnetic field and the ionized interplanetary medium with its own magnetic fields. The energy may be transferred from the outer regions to the inner by means of magnetohydrodynamic waves. It is postulated that geoeactive corpuscles form separate filaments along geomagnetic lines rather than globe-encircling radiation belts. The detection of electrons with energies of several hundred ev at a distance of about 10 earth radii is believed to indicate a transition zone between the geomagnetic field and the interplanetary medium.

ASSOCIATION: none

SUBMITTED: 00

DATE ACQ: 150ct63

ENCL: 00

SUB CODE: AS

NO REF SOV: 000

OTHER: 000

Card 2/2

ACCESSION NR: AT4034379

S/2662/63/000/010/0024/0034

AUTHOR: Krasovskiy, V. I.

TITLE: Hydroxyl emission in the upper atmosphere

SOURCE: AN SSSR. Mezhdunarodnyy geofizicheskiy komitet. IV razdel programmy*
MGG: Polyarnyye siyaniya i svecheniye nochnogo neba. Sbornik statey, no. 10, 1963,
24-34

TOPIC TAGS: meteorology, geophysics, aurora, hydroxyl emission, atmospheric emission,
upper atmosphere emission, ozone hydrogen reaction

ABSTRACT: The author attempts an analysis of the mechanisms of generation and variation of upper atmospheric emissions, preceded by a brief review of the factual data concerning such emission mechanisms. The problem of the rotational temperatures and intensity of hydroxyl bands is considered in detail. It is pointed out that the excessively high rotational temperature of the OH bands indicates that the rotational states of the hydroxyl ion are not in thermodynamic equilibrium with the ambient medium. Variations in the relative and absolute population of vibrational levels constitute evidence of height changes or of processes involving the appearance of excited hydroxyls. Processes are described which permit, at least qualitatively, an explanation of the observed laws in the rotational and

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ACCESSION NR: AT4034379

vibrational temperatures and the intensity values of the atmospheric hydroxyl bands. The mean intensity values of hydroxyl bands in the visible and near-infrared are discussed. The basic information on the ozone-hydrogen process in the formation of excited hydroxyls is presented and analyzed. Reasons are given to show why, at this point and pending further information, the ozone-hydrogen reaction cannot unqualifiedly be accepted as the basic source of hydroxyl emission in the upper atmosphere. Noting that a final selection of the most effective processes is rendered difficult by a lack of precise values for the constants of the assumed reactions, the author considers, by way of example, only one such process (this is a slightly modernized version of a process, formerly proposed by the author, involving vibrationally-excited oxygen molecules; see: V.I. Krassovsky. Ozone-hydrogen hypothesis of the hydroxyl night-airglow. The Airglow and Aurorae, Ed. E. B. Armstrong and A. Dalgarno. London, Pergamon Press, 1956, p. 197-200). The fundamental information regarding this process is illustrated. Its distinguishing feature is its consideration of the atom-exchange reaction between the vibrationally-excited oxygen molecules and the hydroxyl molecule. This reaction can ensure the formation of excited hydroxyl molecules even in the event of the practical absence of atomic hydrogen, the concentration of which in the upper atmosphere may be negligible as a result of diffusion upward and dissipation. The relative concentration of hydroxyl

Card 2/4

ACCESSION NR: AT4034379

In comparison with the concentration of atomic hydrogen will increase as the concentration of atomic oxygen decreases. The reduced concentration of atomic oxygen will promote the extended existence of vibrationally-excited molecules, since their atom-exchange reactions with the oxygen atoms, accompanied by their deactivation, will become less essential. When the concentrations of vibrationally-excited oxygen molecules and atoms are approximately equal, the hydroxyl concentration exceeds the atomic hydrogen concentration approximately 100 fold. Various reactions with vibrationally-excited molecules can lead to a number of emissions in the upper atmosphere. Evidence of intensive vertical mixing of the atmosphere is given in connection with the problem of the photodissociation of the ozone. The clearly marked correlation between the nocturnal emission of sodium and hydroxyl is also explained by their common primary source — vibrationally-excited oxygen molecules. In the author's view, hydrogen emission is caused by the excitation of atomic hydrogen which diffuses upward from the lower regions and then dissipates. The author concludes with a discussion of the hypothesis, first advanced by Chapman, concerning the mechanism for the generation of green emission, noting that there is more and more evidence that Chapman's idea is valid in a broader context, although the problems of atmospheric emissions are found to be far more complex than the originally supposed simultaneous process of the collision of three hydrogen atoms. Orig. art. has: 5 formulas and 6 tables.

Card 3/4

ACCESSION NR: AT4034379

ASSOCIATION: Mezhdudedomstvennyy geofizicheskiy komitet AN SSSR. (Interdepartmen-
tal Geophysics Committee, AN SSSR)

SUBMITTED: 00

DATE ACQ: 13May64

ENCL: 00

SUB CODE: ES

NO REF SOV: 007

OTHER: 016

Card 4/4

GAL'PERIN, Yu.I.; KRASOVSKIY, V.I.; DZHORDZHIO, N.V.; MULYARCHIK, T.M.;
BOLYUNOVA, A.D.; TEMNYY, V.V.; MAROV, M.Ya.

Studying the upper atmosphere with the aid of the satellites
"Kosmos-3" and "Kosmos-5." Kosm. issl. 1 no.1:126-146

J1-Ag '63.

(MIRA 17:4)

L 11112-63

EWT(1)/FCC(w)/FS(v)/BDS/ES(v)--AEDC/AFETC/AFMDC/ESD-3--

ACCESSION NR: AP3000792

Pe-4/Pg-4/P1-4/P1-4/Po-4/Pq-4--TT/GW

S/0203/63/003/003/0401/0407

95
94

AUTHOR: Krasovskiy, V. I.; Gal'perin, Yu. I.; Tomnyky, V. V.; Mulyarchik, T. M.; Dzhordzhio, N. V.; Marov, M. Ya.; Bolyumova, A. D.; Vaisberg, O. L.; Potanov, B. P.; Bragin, M. L.

TITLE: Some characteristics of geoeactive particles

SOURCE: Geomagnetizm i aeronomiya, v. 3, no. 3, 1963, 401-407

TOPIC TAGS: geoactivity, Cosmos-3, Cosmos-5, satellite, particle counter, ionospheric particles, Kosmos-3, Kosmos-5

ABSTRACT: Three types of charged-particle sensors[✓] used on the Cosmos-3[✓] and Cosmos-5 flights are described and some recorded results are discussed. One type was an aluminum tube which housed a fluorescent screen whose photoemission from particle impact was recorded by a photomultiplier. The screen was faced with aluminum foil of 0.4 to 1.1 mg/cm² thickness to prevent passage of low-energy particles. Grids placed at the tube entrance included an accelerating grid for applied stepped voltages of up to 11 kv and a bias grid at -40 v to prevent impact of thermal electrons on the foil. The fluorescent screen was made thin (1.4 mg/cm²) so as not to respond to x-ray radiation. Each such

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indicator subtended about $1/12$ steradian and had its axis normal to the satellite rotational axis; each satellite had several indicators. A second tubular device, acting as a trap for high-speed protons and electrons, was similar in construction but had an annular collecting electrode placed in a permanent-magnet field rather than a screen. The bias grid in this case eliminated electrons of less than 5 kev. Angular coverage of the trap counter was about 1 steradian. The third collector used was a standard Geiger counter, type STS-5, which was inside the satellite skin and had a 5-mm lead shield to minimize x-ray effects. This counter responded only to electrons above 0.4 Mev and protons above 50 Mev, but is described as too primitive to distinguish their relative contributions. Results from the three types of recorders are discussed as functions of satellite altitude, latitude, and day/night exposure. Three general energy groupings appear to exist: 1) electrons of 10^2 — 10^4 ev at maximum flux density of 10^9 el/cm²/sec/ster, observed at levels above 300 km over the USSR (30—35° N); 2) electrons of about 100 kev, with a maximum density of 2×10^7 el/cm²/sec/ster, noted mainly in southern latitudes at altitudes of 600—700 km over the South Atlantic; and 3) the very high energy protons and electrons registered by the Geiger counter at peaks of 100 pulses/cm²/sec/ster [not associated with any particular geographical region]. Orig. art. has: 7 figures.

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